"This book understands the garden to be that part of the premises which is devoted to ornament, and to the growing of vegetables and fruits either for the home consumption or for market. The garden is, therefore, an ill-defined demesne; but the reader must not make the mistake of defining it by dimensions, for one may have a garden in a flower pot or on a thousand acres. In other words, this book believes that every bit of land which is not used for buildings, walks, drives, and fences, should be planted. What we shall plant—whether sward, lilacs, thistles, cabbages, pears, chrysanthemums, or potatoes—we shall talk about as we proceed."

And talk about it the author does, in the most interesting and attractive style, bringing forth out of the treasures of his experience and observation things new and old. In a hundred pages and more of general advice he tells the things which the novice most needs to know, and, if we mistake not, many things which the professional gardener would be profited by knowing. Then follows a discussion of the principles of landscape art as they apply to planting city yards, suburban grounds or rural estates. A third section is devoted to suggestions in regard to ornamental planting; a fourth to the fruit plantation, and another to the vegetable garden. In fact there is no one who owns the land on which he lives who would not find in this book something of profit and interest.—C. R. B.

THE ANNUAL REPORT of Mr. Fawcett as director of the gardens of Jamaica contains many items of interest in connection with his recent description of gardens in this journal (Nov. 1897). During the year 264,000 plants were distributed from the Hope Gardens to planters and farmers, and to this total is to be added the specimens sent out from the other gardens, which are used as minor distributing centers. Cultural and acclimatization experiments of great value have been carried on, and the economic efficiency of the system of gardens is certainly many times in excess of the actual cost to the island government. Among the points of scientific interest presented in the report, it is noted that Bermuda lilies grown in Jamaica show a rapid multiplication of bulbs, with no resting period of any sort.

Although no systematic survey is in progress, seven new species of phanerogams and forty-four species of mosses were collected during the year by various members of the staff.—D. T. MCDOUGAL.

NOTES FOR STUDENTS.

MESSRS. HITCHCOCK AND CLOTHIER have made a report upon the vegetative propagation of the perennial weeds of Kansas.[7] In it is contained an

[6] BAILEY, L. H.—Garden-making: suggestions for the utilizing of home grounds. Aided by L. R. Taft, F. A. Waugh, and Ernest Walker. 12mo., pp. viii + 417, *figs.* 256. New York: The Macmillan Co., 1898. $1.

[7] Bull. 76, Feb. 1898, Experiment Station of the Kansas State Agricultural College.

exhaustive list of the common weeds, grouping them as follows: those which propagate by creeping roots, by creeping stems, or by forming "crowns." A summary is made of a number of experiments upon weeds with exceptional powers of vegetative reproduction. One of the most striking results was in the case of *Enslenia alba*, the climbing milkweed. Ten one-inch pieces of the root stock were planted ten inches below the surface, and seven of these sprouted. The immediately practical value of the report is found in the methods suggested for killing perennial weeds, and in illustrated descriptions of the underground parts of forty-eight of the commonest vegetable pests.—J. G. COULTER.

DR. DOUGLAS H. CAMPBELL,[8] in continuing his studies among the lower monocotyledons, has investigated the peculiar and monotypic *Lilæa subulata*, a characteristic Pacific coast form, ranging from Oregon to southern South America. In some important respects the results confirm those already obtained by the author in his investigation of Naias and Zannichellia, such as the cauline origin of both microsporangia and megasporangia, and the plerome origin of the sporogenous tissue of the stamen. This departure from the ordinary hypodermal origin of this tissue is noteworthy. The usual indefiniteness of the tapetum was also observed, one or two layers of wall cells and certain sterile sporogenous cells functioning as such. Just what the "tapetum proper" is it would be difficult to say.

The development of the megaspore presented no unusual characters, but the meager preparations did not permit a clear statement. There is enough variation in these structures to demand multiplied preparations before conclusions can be regarded as safe. The antipodal cells are not of the evanescent type, but organize into vigorous cells. A remarkable exceptional condition was the occurrence of a mass of tissue in the micropylar end of the embryo sac, replacing the egg-apparatus. Just what this signifies it is hard to say. Of course, we should be pleased to discover some certain evidence of the occurrence of nutritive tissue in the embryo sac of angiosperms before fertilization, and especially in the micropylar region, and every such observation as the above stimulates our expectation.

Perhaps the most unexpected result is the peculiar relation of the primary root apex to the axis of the embryo. Instead of lying in the axis of the terminal cotyledon towards the suspensor, it is directed to one side, almost continuing the axis of the lateral stem apex. The author regards this as a lateral origin of the root, and remarks that it is suggestive of the root of Isoetes, the basal segments of the embryo and the suspensor being possibly the equivalents of the "foot" of pteridophytes.

The author again finds that the primary suspensor cell does not divide, and that the embryo is derived entirely from the terminal cell resulting from

[8] Annals of Botany **12**: 1–28. 1898.

the first division. This is certainly different from most dicotyledons studied, and does not hold for Lilium, but it may be quite a constant feature among the more primitive monocotyledons.

It is a satisfaction to note that these investigations are confirming the growing belief that many of the so-called "reduced" forms are rather primitive forms.—J. M. C.

BY ISOLATING another form from the river Thames, Professor H. Marshall Ward[9] has made an addition to our list of violet-pigment bacteria. The form is somewhat polymorphic. When in favorable culture media, the bacterium may appear in the form of a filament 50–60μ in length, though it is usually a bacillus. When in adverse cultural environment it may be reduced to the micrococcus type. It is motile, being very actively so in the case of the bacilli of medium length. No spores are formed, unless the micrococcus forms be considered such, and they do not show the characters of true spores. The bacterium is not pathogenic for guinea pigs.

In all ordinary culture media the bacillus develops abundant growths. On gelatin plates the contour of the colonies is very similar to that of *Bacillus typhosus*, but as they become older those near the surface break through as small cones in a way very different from the typhoid colonies.

At about ten days' growth liquefaction begins, and at this time the superficial colonies begin to show a slight formation of the violet pigment which darkens slowly, and after several days becomes as dark in color "as a strong solution of gentian violet." By means of several culture media it was shown that the pigment is in the living zooglea mass, and not mixed with the active bacilli beneath the mass. Microscopical examination failed to demonstrate the existence of the pigment within the bacterial cells, but indicates that it exists external to the cell-walls which compose the zooglea matrix. The pigment is slightly soluble in water and readily so in alcohol.

There have been at least a dozen other descriptions of violet-pigment bacteria, and the opinion has prevailed among bacteriologists that when the life-histories are carefully worked out, several or perhaps all of the forms described may be reduced to a single type. The bacillus here described, however, seems to have characters which make it distinctly different from those previously described.— OTIS W. CALDWELL.

ITEMS OF TAXONOMIC interest are as follows: A. A. Eaton[10] has described a new Isoetes (*I. minima*) from Washington, being trilobed and with partial velum, as well as the smallest American species. W. N. Suksdorf[11] has published a key to the species of Plectritis and Aligera, the former with nine

[9] Annals of Botany **12**: 59. 1898.
[10] Fern Bulletin **6**: 30. 1898.
[11] Erythea **6**: 21–24. 1898.

species, the latter with ten, one of which is new. George V. Nash[12] has published a new genus of grasses, *Blepharoneuron*, a monotypic genus based upon *Vilfa tricholepis* Torr. G. N. Best[13] has described a new genus of mosses, *Fabroleskea*, based upon *Leskea Austini* Sulliv. Edward L. Greene[14] has described several new species of Compositæ from a collection made by E. O. Wooton in southeastern New Mexico, among which is a new genus, *Wootonia*, "about equally allied to Bidens and Cosmos." L. M. Underwood[15] has published a discussion of *Selaginella rupestris* and its allies, in the course of which he describes six new species. John K. Small,[16] in continuing his descriptions of numerous new species from the southern United States, proposes a new genus of Paronychiaceæ, *Forcipella*, based upon *Siphonychia Rugelii* Chapm. E. O. Wooton[17] has described an interesting new rose from New Mexico, *R. stellata*, which is the second member of a hitherto monotypic section (MINUTIFOLIÆ) of the genus. Edward L. Greene,[18] in recent folios of *Pittonia*, has published as follows: Results of a study of the Macoun Canadian collection of the species of Antennaria, fifteen new species being described, to which are appended three other new species of the genus from the southwest; a new genus of the Senecionidæ, *Rainiera*, based upon *Prenanthes stricta* Greene (*Luina Piperi* Robinson, *Psacalium strictum* Greene); seven new species of Erigeron; the establishment of the genus *Microsteris*, based upon *Collomia gracilis* Dougl., from which six additional species are segregated; and the establishment of the genus *Gymnosteris*, based upon *Collomia nudicaulis* Hook. & Arn.— J. M. C.

EDWARD L. GREENE[19] calls attention to the occurrence of "parthenogenesis" in *Antennaria plantaginifolia*, as well as in some of the so-called cleistogamous flowers of Viola. Of course he only means the setting of seed without pollination, but the observation suggests a profitable subject of investigation for the morphologist. It is hardly likely that it is a case of parthenogenesis, for this has been disproved for all such claims for the higher plants, but it is always interesting to know the origin of the vegetatively developed embryos.— J. M. C.

CONSIDERABLE INFORMATION about the natural conditions of plant life and the extent of the vegetation in Alaska is embodied in a recent report to

[12] Bull. Torr. Bot. Club **25**: 88. 1898.
[13] Bull. Torr. Bot. Club **25**: 108. 1898.
[14] Bull. Torr. Bot. Club **25**: 117–124. *pl. 330–335*. 1898.
[15] Bull. Torr. Bot. Club **25**: 125–133. 1898.
[16] Bull. Torr. Bot. Club **25**: 134–151. 1898.
[17] Bull. Torr. Bot. Club **25**: 152–154. 1898.
[18] Pittonia **3**: 273–311. 1898.
[19] The Plant World **1**: 102. 1898.

Congress[20] regarding the desirability of establishing experiment stations in that region. In many places the soil is remarkably rich, and native grasses and associated plants attain uncommon stature. A list is given of over one hundred species of economic plants collected by Mr. Evans.—J. C. A.

A RECENT PAPER by W. West and G. S. West[21] presents many interesting facts concerning the habits, methods of reproduction and structure of the Conjugatae, together with an interesting diagram of possible phylogeny.

One is not apt to realize the extent of parthenogenesis and other means of non-sexual propagation that are present in this group of plants. Filaments may fragment, and resting cells or cysts may carry the species through unfavorable conditions, but the most interesting structures are the parthenogenetic spores called aplanospores. These are thick-walled reproductive cells, formed by the contraction of the protoplasm in a vegetative cell and the secretion around itself of a heavy membrane. That such structures are parthenogenetic spores is proved by their not infrequent occurrence side by side with zygospores in the same material. They have been observed in several species of Mougeotia, Zygnema, and Spirogyra, as well as among the desmids in Closterium, Spondylosium and Hyalotheca. There is, however, one genus, Gonatonema, that reproduces entirely through such non-sexual spores, and yet is so closely allied to Mougeotia that the filaments are not to be distinguished in the sterile condition. There can be no doubt of the close affinities between these two genera, although one has entirely given up the method of sexual reproduction.

The diagram of phylogeny places Mougeotia at the end of a long line of ascent, with Gonatonema as a degenerate offshoot, and Temnogametum as a side branch. Spirogyra and Zygnema with other allied genera occupy the tips of another distinct system of branches. The Desmidiaceæ are regarded as an offshoot and somewhat degenerate group from this second main branch, and are not connected directly with the unknown ancestral types.—BRADLEY MOORE DAVIS.

ARTHUR H. CHURCH[22] has investigated the polymorphy of *Cutleria multifida* (Grev.). This plant unfortunately is not found on our temperate coast, so that its interesting peculiarities cannot be very well known to American botanists. There are two plants, described as the genera Cutleria and Aglaozonia, that have long been suspected to be phases of a complicated life cycle, and this paper largely deals with this problem.

[20] TRUE, A. C.—A report to Congress on agriculture in Alaska, including reports by Walter H. Evans, Benton Killin, and Sheldon Jackson. Bulletin of Office of Exper. Stations, no. 48, pp. 36, *pl. 23*. 1898.

[21] Annals of Botany **12**: 29–58. *pls. 4* and *5*. 1898.

[22] Annals of Botany **12**: 75–109. *pls, 7–9*. 1898.

Cutleria is a delicate little plant of the Phæozoosporeæ, that commonly grows in quiet water at a depth of at least two fathoms below tide mark, and vegetates at a mean temperature of 16°. It is widely distributed along the coast of Europe and in the Mediterranean, but is a seasonal form, being quite sensitive to changes of temperature. Thus at Plymouth, England, it is a summer annual which disappears in October. Cutleria bears sexual organs that discharge biciliated gametes of two sizes which have been observed to conjugate, the smaller with the larger. But the sexuality apparently depends upon a narrow range of physical conditions, and when these conditions are not present the plant is parthenogenetic. Thus, although the process of fertilization has been observed at Naples by two investigators, Reinke and Falkenberg, parthenogenesis is known to be extensively present among these plants in the English Channel at the end of the summer. Perhaps the parthenogenesis is associated with a fall in temperature. Extensive experiments by various observers have proved that the oospheres of Cutleria, whether fertilized or developing parthenogenetically, produce young plants with undoubted Aglaozonia characters.

Aglaozonia is a perennial on the English coast, much coarser in histology and stronger constitutionally than Cutleria, for it can stand a range of temperature from less than 3° to more than 20°. It also grows in far more exposed situations than the latter plant. Church has been able to raise young plants from the zoospores of Aglaozonia, and these developed protonema-like creeping filaments that finally matured Cutleria antheridia. These may be regarded as "precociously developed" male plants. Thus experiment has connected back and forth into one life history the forms formerly known as Cutleria and Aglaozonia.

It is well to bear in mind how unsettled are the data in respect to sexuality among the Phæozoosporeæ at the present time. *Ectocarpus siliculosus* is one of the classical forms in which sexuality among these algæ was first announced. But Kuckuck believes that this species is constantly parthenogenetic at Kiel, and Reinhart has observed both the conjugation and direct germination of gametes. And again, extensive studies by Sauvageau upon several species of Ectocarpus indicate that motile cells usually considered as gametes germinate without difficulty.—BRADLEY MOORE DAVIS.